Proposal Reviews

#242: Pyrethroid Insecticides: Analysis, Occurrence, and Fate in the Sacramento and San Joaquin Rivers and Delta

US Geological Survey

Final Selection Panel Review	
Initial Selection Panel Review	
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Environmental Compliance	
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Final Selection Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Final Selection Panel Review

Proposal Number: 242

Applicant Organization: US Geological Survey

Proposal Title: Pyrethroid Insecticides: Analysis, Occurrence, and Fate in the Sacramento and San Joaquin Rivers and Delta

Please provide an overall evaluation rating.

Fund	
As Is	**-**
In Part	**X**
With Conditions	**-**
Consider as Directed Action	**-**
Not Recommended	**-**

Amount: **$800,000.00**

Conditions, if any, of approval (if there are no conditions, please put "None"):

Fund only: (1) the study's methods development component and (2) the analysis of limited numbers of environmental samples (water, colloids, sediment, and aquatic biota) from the Sacramento and San Joaquin rivers and in the Delta, as needed and sufficient to test the analytical methodology.

Provide a brief explanation of your rating:

The Clean Estuary Partnership's comments endorse the panel's recommendation to partially fund this proposal.

Initial Selection Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Initial Selection Panel Review

Proposal Number: 242

Applicant Organization: US Geological Survey

Proposal Title: Pyrethroid Insecticides: Analysis, Occurrence, and Fate in the Sacramento and San Joaquin Rivers and Delta

Please provide an overall evaluation rating.

Explanation of Recommendation Categories: Fund

- **As Is** (a proposal recommended for funding as proposed)
- **In Part** (a proposal for which partial funding is recommended for selected project phases or components)
- **With Conditions** (a proposal for which funds are recommended if the applicant contractually agrees to meet the specified conditions)

Consider as Directed Action in Annual Workplan (a proposal addressing a high priority action that requires some revision followed by additional review prior to being recommended for funding)
Not Recommended (a proposal not currently recommended for funding-after revision may be considered in the future)

Note on "Amount":

For proposals recommended as Fund As Is, Fund In Part or Fund With Conditions, the dollar amount is the amount recommended by the Selection Panel.

For proposals recommended as Consider as Directed Action in Annual Workplan, the dollar amount is the amount requested by the applicant(s).

Fund	
As Is	**-**
In Part	**X**
With Conditions	**-**
Consider as Directed Action	**-**
Not Recommended	**-**

Amount: **$800,000**

Conditions, if any, of approval (if there are no conditions, please put "None"):

Fund only: (1) the study's methods development component and (2) the analysis of limited numbers of environmental samples (water, colloids, sediment, and aquatic biota) from the Sacramento and San Joaquin rivers and in the Delta, as needed to test the analytical methodology.

Provide a brief explanation of your rating:

This proposed project would develop analytical methods (not presently available) for quantifying pyrethroid insecticides in a number of environmental matrices. Pyrethroids are an extremely toxic, hydrophobic group of insecticides whose application in the Sacramento and San Joaquin river basins has roughly tripled in recent years. Pyrethroid insecticides are extremely toxic to fish and could adversely hinder restoration of targeted fish species; however, exposure to and ecological effects of pyrethroid insecticides in the Sacramento and San Joaquin rivers and Delta cannot be assessed until reliable methods are available for quantifying their abundance in water, sediment, and biota. This proposal, which addresses one multi-regional and three regional priorities, received high rankings from the Delta, San Joaquin, and Sacramento regions.

The project, as proposed, contains two distinct components. The first (funded) will develop analytical methods for quantifying pyrethroid insecticides in water, colloids, sediment, and biota. The project goals related to methods development are clearly stated and considered feasible by technical reviewers. The second proposed component (not funded) would examine the occurrence and fate of pyrethroids in field studies; however, the proposed field component was considered to be less well developed and premature until reliable analytical methods have been developed.

The Selection Panel agrees that the methods development component of this study should be funded, given that development of analytical methods for quantifying pyrethroid insecticides is an essential first step towards examining the abundance, fate, and ecological effects of these compounds in the ecosystem. The Panel supports the analysis of limited numbers of environmental samples (water, colloids, sediment, and aquatic biota) from the Sacramento and San Joaquin rivers and in the Delta, as needed to test the analytical methodology. The Panel, in agreement with the technical reviewers, does not support funding for the proposed field studies outlined in the proposal.

Research and Restoration Technical Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Research and Restoration Technical Panel Review Form

Proposal Number: 242

Applicant Organization: US Geological Survey

Proposal Title: Pyrethroid Insecticides: Analysis, Occurrence, and Fate in the Sacramento and San Joaquin Rivers and Delta

Review:

Please provide an overall evaluation summary rating:

Superior: outstanding in all respects;
Above Average: Quality proposal, medium or high regional value, and no significant administrative concerns;
Adequate: No serious deficiencies, no significant regional impediments, and no significant administrative concerns;
Not Recommended: Serious deficiencies, significant regional impediments or significant administrative concerns.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XSuperior	**This project is judged to be superior for the methods development part. There is widespread agreement that there is a pressing need for development of analytical methods for this important group of pesticides. This project received high rating by several regions. The field component of the project was less well developed and its success will hinge critically on the methodological work meeting its goals. The panel recommends that the field component be removed or considerably scaled down so that initial effort can be fully devoted to optimizing the methods.**
-Above average	
-Adequate	
-Not recommended	

1. **Goals and Justification.** Does the proposal present a clear statement of goals, objectives and hypotheses? Does the proposal present a clear justification and conceptual model for the project?

   The goals, objectives and hypotheses are clearly stated and timely. The need to develop an analytical method for pyrethroids is clearly justified.

2. **Likelihood of Success (Approach, Feasibility, Capabilities and Performance Measures).** Is the project likely to succeed based on the approach, feasibility and project team capabilities? Are the proposed performance measures adequate for measuring the project's success?

   The approach is fully documented. The steps to be taken are clear and feasible. Whether it will be possible to develop standard methods for detection of pyrethroids to the very low detection limits aimed for is more difficult to judge. The scale as well as the combination of method development and focused field study is appropriate. However, it may be preferable

to conduct the work in phases with the first phase devoted entirely to methods development and a second phase focused on field studies.

Analyses of the same samples will be conducted by all three participating laboratories providing very advantageous in the method validation process. The performance measures for the method development are very clear.

Details of field monitoring were not complete enough for full evaluation. It was difficult to judge whether the monitoring programs will be adequate descriptions of smelt and salmon exposure to the pesticides.

The applicants judged fully capable of conducting this work.

3. **Outcomes and Products.** Will the project advance the state of scientific knowledge in general and/or make an important contribution to the state of knowledge of the Bay-Delta Watershed? For restoration proposals, is the project likely to contribute to ecosystem restoration or species recoveries in a significant way? Will the project produce products useful to decision-makers and scientists?

   The expected product will be a routine method for pyrethroid analysis in different media. Interestingly the applicants do not list this as one of their products. In addition important information on fate of pyrethroids in specific use scenarios will be provided.

4. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   This 3 year project has a total budget of $1,634,206. They are applying for a GC/MS and associated analytical equipment in order to perform the work. Half of the cost of the GC/MS will be covered by CDFG.

   One reviewer indicated that the high cost of the project could be reduced by removing the field component given that method development is the most important part. Best scenarios for field investigation could be selected for a later project.

5. **Regional Review.** How did the regional panel(s) rank the proposal (High, Medium, Low)? Did the regional panel(s) identify significant benefits (regional priorities, linkages with other activities, local involvement) or impediments (local constraints, conflicts with other activities, lack of local involvement) to this proposal? What were they?

   Delta Regional Review ranked the project high because information on and analysis of pyrethroid pesticides and their effects is currently lacking, and this was the best proposal to address data gaps.

   San Joaquin Regional Review ranked the project high based on the need to develop an analytical method for detecting pyrethroids since they are replacing other pesticides in the region. Noted that other projects aiming to look at fate and transport of pyrethroids may be dependent on the analytical methods developed here. This review recommended a phased approach with initial emphasis placed on method development.

   Sacramento Regional Review ranked the project high because it would provide much needed information regarding pyrethroid insecticides. They noted similarity to proposal #212. This review recommended additional outreach to local landowners.

6. **Administrative Review.** Were there significant concerns about the proposal with regard to the prior performance, environmental compliance and budget administrative reviews? What were they?

   Re. Prior performance: applicant is USGS. NFWF is currently implementing an interagency agreement between USGS and State. NFWF was not involved in the contract negotiations. USGS is also a subcontractor under 99-N08. Progress on previous project satisfactory.

   Re. Environmental compliance: requires compliance with CESA, FESA, CWA Section 402, County Agriculture Commission, possible approvals from the Reclamation Board and the State Lands Commission. Corresponding CEQA and NEPA documentation also required. No time or funds have been allocated for these leading to delay in project implementation.

   Re Budget: Project management tasks described but no specific costs enumerated.

Miscellaneous comments:

None

Delta Regional Review:

Proposal Number: 242

Proposal Title: Pyrethroid Insecticides: Analysis, Occurrence, and Fate in the Sacramento and San Joaquin Rivers and Delta

Overall Ranking: **-**Low **-**Medium **X**High

Provide a brief summary explanation of the committee's ranking:

The panel was in agreement that information on and analysis of pyrethroid pesticides and their effects is currently lacking, and this was the best proposal to address data gaps.

1. Is the project feasible based on local constraints?

   XYes **-**No

   How?

   This is a research project, and as such, does not require CEQA/NEPA compoiance nor permits for access.

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   MR-5: Ensure that restoration is not threatened by degraded environmental water quality. DR-6: Restore shallow water habitats in the Delta for the benefit of at-risk species while minizing potential adverse effects of contaminants.

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   XYes **-**No

   How?

   This study complements other ERP studies assessing ecological effects of contaminants, and proponent is discussing possible collaboration with other CALFED research projects in the Delta. The results of this study would also be useful to the Delta Dredge Reuse Strategy (funded by CALFED), which has in its efforts encountered a lack of adequate data on pyrethroids and their fate in the environment.

4. Does the project adequately involve local people and institutions?

   XYes **-**No

How?

Project proponent would notify interested entities and other parties on methodology and field sampling. The project would also host a website, conduct quarterly meetings, and have a final report available for public review. Stakeholders may receive presentations on the study and its findings as requested.

Other Comments:

An important project to help fill identified data gaps.

San Joaquin Regional Review:

Proposal Number: 242

Applicant Organization: US Geological Survey

Proposal Title: Pyrethroid Insecticides: Analysis, Occurrence, and Fate in the Sacramento and San Joaquin Rivers and Delta

Overall Ranking: **-**Low **-**Medium **X**High

Provide a brief summary explanation of the committee's ranking:

The need to develop an analytical method for detecting pyrethroids in environmental samples is paramount, as it is replacing other insecticides in agriculture throughout the Bay/Delta region. The reviewers thought that the study should be narrowed to concentrate on this task.

1. Is the project feasible based on local constraints?

   XYes **-**No

   How?

   The proposal states that several laboratories will work together to develop analytical methods for detecting pyrethroids in several media, and that 3 labs will coordinate the work in water. That should improve the potential for positive, verifiable results.

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   The priority addressed is the reduction of degraded water quality resulting from the delivery of pyrethroid insecticides to regional water bodies via agricultural practices.

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   XYes **-**No

   How?

   This proposal seems to be the pivotal one; several others, looking at the fate and transport of pyrethroids, plan to use the analytical methods developed by this laboratory to verify their results.

4. Does the project adequately involve local people and institutions?

XYes **-**No

How?

The proposal states that local persons and institutions will be contacted. Contact with the San Francisco Bay and Central Valley CRWQCBs is documented.

Other Comments:

The proposal outlines other tasks in addition to developing analytical methods. While the reviewers acknowledge the need to verify the methods using environmental samples, they believe a phased approach, starting with development of methods, is more likely to produce the desired results.

Sacramento Regional Review:

Proposal Number: 242

Applicant Organization: US Geological Survey

Proposal Title: Pyrethroid Insecticides: Analysis, Occurrence, and Fate in the Sacramento and San Joaquin Rivers and Delta

Overall Ranking: **-**Low **-**Medium **X**High

Provide a brief summary explanation of the committee's ranking:

This study, as outlined would provide much needed information regarding pyrethroid insecticides.

Note similarities to a UCD proposal on pyrethroids (#212).

1. Is the project feasible based on local constraints?

   XYes **-**No

   How?

   There will be a need to collect data in the field. Also, data will be available from other agencies.

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   It pursues Multi-region, Sacramento region, San Joaquin region and Delta Region priorities.

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   XYes **-**No

   How?

   Linked to Delta smelt restoration activities.

4. Does the project adequately involve local people and institutions?

   XYes **-**No

How?

But, the outlined program would benefit from better outreach to local landowners at the onset of the program (phase one) and as the program progresses.

Other Comments:

As mentioned above, there is a critical need to provide outreach and information to local landowners, who are concerned with the regulation of pesticides and the effect on their operations.

The regional panel is relying upon the technical panels to provide input regarding the relevance of the different water quality programs relative to current data collection and analysis activities and the need for additional data.

External Scientific: #1

Research and Restoration External Scientific Review Form

Proposal Number: **242**

Applicant Organization: **US Geological Survey**

Proposal Title: **Pyrethroid Insecticides: Analysis, Occurrence, and Fate in the Sacramento and San Joaquin Rivers and Delta**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

None

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
-Excellent	**It is difficult to review this proposal against the standard research proposal criteria, since it describes an effort to enhance analytical capabilities in the region. This reviewer is not aware of the scope of Calfed--is such program development part of your mission? This project will not advance the state of the science much, but could be viewed as an investment in monitoring capacity. Nonetheless, it is quite expensive. If I were the Program Manager, I would decline this request based on its lack of a research focus and its high cost.**
XGood	
-Poor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   The goals of this proposal are to develop an analytical method to measure low levels of six pyrethroid insecticides in water, sediments, and biota and to apply this technique to document levels of the target analytes downstream of rice fields and orchards. Three years are proposed, with analytical development in the first year and field studies in the following two. The total budget requested is $1.63M. This is more of a project development proposal than a research project. The goal seems to be to develop local analytical expertise to support field monitoring programs in the Sacramento and San Joaquin systems. If successful, this

project would allow three government laboratories in the area to be able to accurately and precisely measure these six pesticides. The field component of the proposal does not explore the fundamental processes controlling the fate and transport of these pesticides, nor does it provide sufficient spatial and temporal coverage to be considered a monitoring program (as admitted in the text of the proposal). Rather, the field program is designed to demonstrate that the laboratories have successfully developed the methods.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   The authors are partially correct when they state that there is no suitable off-the-shelf methods readily available to simultaneously measure all six of these insecticides in water at low levels. However, several papers in the literature describe methods for two of these pesticides (esfenvalerate, permethrin), and the authors appear to have a method for bifenthrin. Therefore, rather than exploring new analytical chemistry, what is proposed here is tweaking existing methods to optimize performance. Although this is a necessary component of the regional assessment capability, it is not research in the classic sense of discovery. There is no conceptual model presented in the proposal other than the discussion of pesticide partitioning among dissolved, suspended, and collidal particles. The authors are correct that it is important to be able to accurately measure the target chemicals in these phases, but they do not discuss how these field measurements, if successful, in the rice and orchard studies will advance our understanding of pesticide partitioning.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   The strength of the proposed approach is the recognition that getting the analytical chemistry correct is critical for assessing the potential impact of pyrethroids in the region. Having three government laboratories working together may benefit the program by insuring the methods developed here are transferrable to other laboratories. The details of how the method will be developed are quite vague, and the proposal simply state the goals of the analytical method, now how they will systematically work through the problems to finalize the method. The proposed field program will (assuming the analytical method is satisfactory) provide the local managers some idea of the levels of these six insecticides downstream from important agricultural practices. It is unlikely that the project will generate novel methodology or approaches; more likely it will improve existing methods.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   The likelihood of success (developing a suitably sensitive analytical technique) is quite high. As mentioned above, similar techniques for individual pyrethroid insecticides exist, so building a method for six should be low risk.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

Among research programs, developing performance measures for projects to develop analytical techniques is perhaps the easiest. The authors clearly state their goal is to develop a technique that is sufficiently sensitive to measure six pyrethroid insecticides in ambient water. Using the standard analytical metrics of accuracy, precision, sensitivity, etc. will allow the performance of this project to be easily documented. It is much less clear how the field program will be evaluated. Naturally these insecticides will be detected in water downstream from their application points.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   The main product from this study would be having three local laboratories with demonstrated analytical capability to measure pyrethroid insecticides in water and sediments. While the local managers likely will benefit from such in-house expertise, a question not addressed in the proposal is whether it would be more efficient (in terms of time and money) to take advantage of other laboratories nation-wide with this expertise. For example, the USGS laboratory in Arvada, Colorado has a strong track record of developing and applying pesticide methods in surface and ground waters. Are the benefits of doing the analytical work in the region sufficient?

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   The project team is qualified to conduct the analytical method development portion of this project. It is less clear whether they have the geochemical expertise to fully interpret the results of the field investigations. However, they appear to be tied into other assessments of pesticide effects in the region, which implies that they would provide the analytical support for these larger efforts.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   The budget seems much too high for the scope of the proposed work. Aside from the personnel costs (which are difficult to judge), they request $124K for supplies and expendables and $115K to purchase a new gas chromatograph/mass spectrometer. Neither expense if justified in this project. The supplies budget works out to more than $3000 per month, which is comparable to the total monthly supplies budget for my laboratory, which employs 12 full-time analytical technicians. Although I realize that considerable time is required to develop new methods, in the end Calfed would receive improved analytical capabilities for six pesticides and two modest field studies for $1.6M. These fund would go much further by contracting with laboratories which already have (or could easily develop) the analytical techniques, resulting in many more field measurement of these insecticides. The critical cost/benefit question, therefore, is whether the group values fostering regional analytical capabilities enough to spending this amount.

Miscellaneous comments:

External Scientific: #2

Research and Restoration External Scientific Review Form

Proposal Number: **242**

Applicant Organization: **US Geological Survey**

Proposal Title: **Pyrethroid Insecticides: Analysis, Occurrence, and Fate in the Sacramento and San Joaquin Rivers and Delta**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

none

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**This is an important project proposal that is carefully researched and well designed. It should receive the highest consideration for funding.**
-Good	
-Poor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   This is an excellent proposal. The goals, objectives, and hypotheses are clearly stated, and the objectives are exceptionally sound and consistent. More importantly, the proposed research addresses a critical scientific uncertainty with respect to the transport and fate of pyrethroid insecticides in aquatic and estuarine systems. Pyrethroids are rapidly replacing organophosphate and carbamate insecticides for use in a wide variety of agricultural and urban watersheds. Some organophosphates and carbamates, including diazinon, chlorpyrifos, and carbofuran, pose a significant risk to aquatic communities and threatened or endangered fish populations in the Sacramento and San Joaquin rivers and the delta estuary. However, as these chemicals are phased out, a switch to pyrethroids may do little to improve the situation for at-risk fish species (as noted in the supporting letter by Karen

Taberski). In general, fish are very sensitive to pyrethroids, and short-term exposures will kill animals at concentrations that are orders of magnitude below the lethal concentrations for most organophosphates and carbamates. Consequently, natural resource managers should be very concerned about potential increases in pyrethroid transport to fish habitat.

Like the DDTs, pyrethroids act on voltage-activated sodium channels in the fish nervous system. For some fish, 96 hr LC50 values are in the low parts-per-billion (ppb). Moreover, important sublethal effect can be expected at dissolved concentrations in the parts-per-trillion (ppt). Critically, if pyrethroids interfere with the essential physiological or behavioral requirements of fish, they may undermine ongoing efforts to conserve or recover natural populations.

To evaluate the risk that pyrethroids pose for fish populations, resource managers must first understand 1) the fate and transport of these chemicals to river systems and the estuary, 2) the impacts of pyrethroids on invertebrate communities and the aquatic food chain, and 3) the (sublethal) impacts of pyrethroids on the essential biological functions (e.g. nervous system function, behavior, reproductive biology, early development, endocrine function, etc.) in the fish species of concern.

Due to inadequate detection methods, it has been very difficult to determine the fate and bioavailability of pyrethroids in aquatic ecosystems. More specifically, reliable and consistent detection thresholds in the ppt have not been achieved. This means that pyrethroids cannot be monitored at the concentrations at which they are likely to have toxicological impacts on fish. Moreover, the persistence of pyrethroids, their bioavailability, and their fate in different matrices are poorly understood.

This project will directly address these information gaps. The development of new detection methods is very timely, and the proposed field studies will yield important new scientific data that will have local, regional, and national management implications.

Rating--excellent

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   The study is highly justified, and it will address a critical scientific uncertainty. The conceptual model is very clearly stated in the proposal. The use of a Project Advisory Team, with input from fisheries biologists and toxicologists, should help to ensure that the field components of the project are rigorous and targeted to the appropriate geographical sites. The successful execution of this project, particularly with respect to the development of new detection methods, requires an enormous attention to detail. The investigators have proposed a very careful and meticulous approach that is consistent with a full-scale implementation project.

   Rating--excellent

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

One of the major strengths of this proposal is the use of laboratory intercalibrations to validate new analytical methods for trace pyrethroids. Similarly, water samples from the field studies will be analyzed in all three laboratories (USGS, CDF-WPCL, and CDFA). In this respect, the project is well designed and it is very likely to generate novel methods and approaches. The information generated by the field sampling studies should, for the first time, provide an accurate picture of pyrethroid delivery to aquatic systems following conventional agricultural applications. This information will be very useful to decision-makers.

Rating--excellent

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   The investigators have the technical expertise, the laboratories, the equipment, and the experience to accomplish the specific goals of this project. I would rate the likelihood of success as "high". The scale of the project is appropriate.

   Rating--very good

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   A critical objective of this proposal is the development of new and standardized analytical methodologies for detecting pyrethroids at trace concentrations that are likely to impact sensitive aquatic organisms. Achieving this goal will be a good measure of the project's success. The other project-specific performance measures are more conventional and appropriate.

   Rating--excellent

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   Products of value from this project are very likely. The development of new detection methods will provide a foundation for future monitoring studies in the Sacramento and San Joaquin Rivers and the Delta. The determination of environmental concentrations of pyrethroids following irrigation return flows and dormant spray runoff will considerably improve our understanding of the fate and transport of these chemicals. This project, together with ecotoxicological studies, will help natural resource managers interpret the potential impacts of pyrethroid applications on sensitive aquatic species.

   Rating--excellent

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   The applicants are well qualified to implement this work. The UGSG, and Dr. Kuivila in particular, have an excellent track record in terms of monitoring the fate and transport of current use pesticides in the Central Valley and the Delta.

Rating--excellent

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   Rating--excellent

Miscellaneous comments:

External Scientific: #3

Research and Restoration External Scientific Review Form

Proposal Number: **242**

Applicant Organization: **US Geological Survey**

Proposal Title: **Pyrethroid Insecticides: Analysis, Occurrence, and Fate in the Sacramento and San Joaquin Rivers and Delta**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

NONE

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**Given the importance of pyrethroids in the region's agriculture and their extreme toxicity to aquatic organisms it is essential that adequate methods be developed to detect these toxicants at relevant concentrations. This project offers a well-designed attempt to develop such methods and additionally will validate them in two focused field studies.**
-Good	
-Poor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   The goals of this project are to develop methods for pyrethroid analysis in different media and to apply the methods on field samples. The hypotheses to be tested are 1) that pyrethroids are present at dissolved concentrations in surface waters near inputs from rice fields and orchards at environmentally-relevant levels with the potential to cause deleterious effects to fish; 2) that pyrethroids partition primarily onto sediments and colloids (this is already established???) which in turn will influence their transport, persistence and bioavailability, 3) that pyrethroids bioaccumulate in the tissues of fish species of concern to detectable and possibly harmful levels.

Development of an adequate method for analyzing this important group of pesticides is clearly important. I am rather surprised to read that such methods do not presently exist.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   Justification is provided by the fact that pyrethroids are a widely (and increasingly) used group of pesticides, they are extremely toxic to nontarget aquatic species, methods for their analysis at environmentally (and ecotoxicologically) relevant concentrations are inadequate.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   The work will focus on the six highest-use pyrethroids. Method development will include optimizing instrumentation methods, standard preparation and handling, and techniques for extraction and concentration. Methods for analysis of water will be performed by all three participating laboratories (USGS, CDF-WPCL, CDFA). The CDFG will develop the methods for bed sediments and biota, and the USGS will focus on methods for colloids and suspended sediments. Criteria for the methods are clearly detailed (p. 5) as are validation criteria (p. 6). An aim is to achieve a detection limit for water in the ng/L range or lower which is important since effects on biota can occur at such concentrations.

   The steps for method development are detailed in Table 2 and data quality indicators are detailed in Table 3.

   Two field studies will be performed. The first will examine transport of pyrethroid insecticides with rice field water releases, and their occurrence and fate in Delta smelt spawning areas. This study will be performed twice with the first measuring only water and the second measuring also sediments, colloids and fish. The second field study will examine rainfall-runoff transport and fate of pyrethroids used on orthards as dormant sprays (performed in year 2 and 3).

   If success the project will result both in new methods for an important group of toxicants as well as relevant information on their behavior in the field.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   The approach is fully documented. The steps to be taken are clear and feasible. Whether it will be possible to develop standard methods for detection of pyrethroids to the very low detection limits aimed for is more difficult to judge. I believe the scale as well as the combination of method development and focused field study is appropriate.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

Analyses of the same samples will be conducted by all three participating laboratories providing method validation. The performance measures for the method development are very clear.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   The expected product will be a routine method for pyrethroid analysis in different media. Interestingly the applicants do not list this as one of their products. In addition important information on fate of pyrethroids in specific use scenarios will be provided.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   The participants all have extensive experience with analytical chemistry and with pyrethroids. Three laboratories (see p. 4) will be involved in the method development and the field testing. This has advantages in terms of the breadth of expertise available, equipment, and method validation.

   In order for the project to be conducted the group needs to acquire the necessary analytical equipment.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   This 3 year project has a total budget of 1,634,206. They are applying for a GC/MS and associated analytical equipment in order to perform the work. Half of the cost of the GC/MS will be covered by CDFG.

Miscellaneous comments:

External Scientific: #4

Research and Restoration External Scientific Review Form

Proposal Number: **242**

Applicant Organization: **US Geological Survey**

Proposal Title: **Pyrethroid Insecticides: Analysis, Occurrence, and Fate in the Sacramento and San Joaquin Rivers and Delta**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

None

Review:

Please provide an overall evaluation summary rating:

<u>Excellent:</u> outstanding in all respects;
<u>Good:</u> quality but some deficiencies;
<u>Poor:</u> serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
-Excellent	**Analytical methods development for this group of pesticides will be an important contribution to managing the area of concern. The investigators are skilled at such a task and, when finished, will constitute a group capable of addressing questions about these pesticides as concerns arise.**
XGood	**The designs of the field experiments are somewhat vague and it is uncertain whether sufficient information will be generated to adequately define the exposure scenarios for the salmon or smelt. Combining this observation with the high cost of the proposed work, I suggest a reduced scope to the project unless CALFED Bay-Delta Program personnel have better information about the importance of these two scenarios (smelt-orchard spraying, chinook salmon-rice exposure). If the two exposure scenarios reflect situations that are extremely important to the funding agency, I would rate the proposal "Excellent" and consider the high cost appropriate.**
-Poor	

1. **<u>Goals.</u>** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

Yes. The goals, objectives and hypotheses are clearly state and consistent. The context of a "hypothesis" for methods development is a bit strained for the first part of the proposal. However, method development is an important phase of any science.

The intent to develop analytical methods for pyrethoid pesticides is timely and important. The proposers do a good job of showing that these insecticides are increasing in use but adequate analytical methods are not available to quantify their movement through agricultural and aquatic systems.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   The development of analytical methods is justified. The conceptual model is clearly stated and explains the underlying need/context for the proposed work. The field sites and situation are appropriate.

   I am uncertain about the justification for the full-scale implementation. It is clear that the analytical methods should be developed. They are needed as use of these pesticides increases in the subject area. But I am uncertain whether or not it is worth the added expense of generating monitoring information for the two field scenarios (rice and dormant spraying of orchards)described in the proposal. The scenarios seem to be important monitoring situations that describe potential exposure to chinook salmon and Delta smelt. The funding agency will have to decide if the high cost of this monitoring field work is appropriate.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   The approach is generally clear and the results will produce analytical methods for important insecticides and produce some data for two appraently important exposure scenarios. The project will not produce "novel" methodologies but will produce standard methods for an emerging class of insecticides. Although the study is not novel or "cutting edge", it will provide useful information for decision-makers. It will also establish an analytical resource in the region that can be applied to questions emerging in the near future.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   Yes. The approach seems quite feasible and has a good likelihood of success. Much of what follows is based on the relatively high cost of the project. Given the high cost, the scale could be reduced by removing some of the field work. The most important product here is the methology. The field work could be reduced or eliminated without compromising the methods development. Once the methods are available, the best field scenarios for investigation could be selected by other investigators or this group of investigators in later proposals.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

Yes. The QC/QA metrics are good and the project measures of success are clear.

The details of the field monitoring (sampling design and statistical analyses) were not complete enough for me to judge adequacy. Therefore, I can not state unambiguously that the monitoring programs will be adequate descriptions of smelt and salmon exposure to the pesticides.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   Yes. The analytical methods will be quite valuable. For restoration or prevention studies, one will need to measure the concentrations and movement of this important group of pesticides. The proposal will provide a means for doing so. This is an important contribution.

   As stated above, the high cost and lack of a detailed design for the field studies make it difficult to judge to interpretative value of the exposure studies for smelt and salmon. I am uncertain whether complete information will be generated with the money allocated to the studies.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   The investigators are very qualified to do the work. They describe a completely adequate infrastructure for the study.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   The budget seems high relative to the products being offered. However, personnel at the CALFED Bay-Delta Program will be able to judge best the specific value of information about the two field studies proposed here. Without further information on the importance of these two field study scenarios to the region, I would suggest that the field portion be reduced to one exposure scenario (e.g., smelt exposure from orchard spraying).

Miscellaneous comments:

None

Prior Performance/Next Phase Funding:

New Proposal Number: 242

New Proposal Title: Pyrethroid Insecticides: Analysis, Occurrence, and Fate in the Sacramento and San Joaquin Rivers and Delta

1. Prior CALFED project numbers, titles, and programs: (*list only projects for which you are the contract manager*)

   99-N08, Assessment of Pesticide Effects on Fish & Their Food Resources in the Sacramento/San Joaquin Delta, UC Berkeley Ecosystem Restoration

2. Prior CVPIA project numbers, titles, and programs: (*list only projects for which you are the contract manager*)

   N/A

3. Have negotiations about contracts or contact amendments with this applicant proceeded smoothly, without persistent difficulties related to standard contract terms and conditions?

   -Yes **-**No **X**N/A

   If no, please explain any difficulties:

   Applicant is USGS. NFWF is currently implementing an interagency agreement between USGS and State. NFWF was not involved in the contract negotiations. USGS is also a subcontractor under 99-N08.

4. Are the status, progress, and accomplishments of the applicant's current CALFED or CVPIA project(s) accurately stated?

   XYes **-**No **-**N/A

   If no, please explain any inaccuracies:

   Primary recipient under 99-N08 is UC Berkeley. USGS is a subcontractor. Status of 99-N08 as reported in proposal is accurate.

5. Is the applicant's progress towards these project(s)' milestones and outcomes to date satisfactory?

   XYes **-**No **-**N/A

   If no, please explain deficiencies:

   Progress on 99-N08 has been satisfactory.

6. Is the applicant's reporting, records keeping, and financial management of these projects satisfactory?

-Yes -No **X**N/A

If no, please explain deficiencies:

7. Will the project(s) be ready for next phase funding in 2002, based on its current progress and expenditure rates?

-Yes -No **X**N/A

If no, please explain:

This is not a next phase project.

Other Comments:

Environmental Compliance:

Proposal Number: 242

Applicant Organization: US Geological Survey

Proposal Title: Pyrethroid Insecticides: Analysis, Occurrence, and Fate in the Sacramento and San Joaquin Rivers and Delta

1. Are the legal or regulatory issues that affect the proposal identified adequately in the proposal?

   -Yes **X**No

   If no, please explain:

   Pesticide discharge requires compliance with: CESA, FESA, CWA Section 402, County Agriculture Commission; possible approvals from the Reclamation Board and the State Lands Commission.

   Corresponding CEQA and NEPA documentation also required.

2. Does the project's timeline and budget reflect adequate planning to address legal and regulatory issues that affect the proposal?

   -Yes **X**No

   If no, please explain:

   No time or funds are allocated for environmental compliance requirements, unless this is under the umbrella of Project Management.

3. Do the legal and regulatory issues that affect the proposal significantly impair the project's feasibility?

   -Yes **X**No

   If yes, please explain:

   But project implementation will be delayed.

Other Comments:

Budget:

Proposal Number: 242

Applicant Organization: US Geological Survey

Proposal Title: Pyrethroid Insecticides: Analysis, Occurrence, and Fate in the Sacramento and San Joaquin Rivers and Delta

1. Does the proposal include a detailed budget for each year of requested support?

   XYes **-**No

   If no, please explain:

2. Does the proposal include a detailed budget for each task identified?

   XYes **-**No

   If no, please explain:

3. Does the proposal clearly state the type of expenses encompassed in indirect rates or overhead costs?

   XYes **-**No

   If no, please explain:

4. Are appropriate project management costs clearly identified?

   -Yes **X**No

   If no, please explain:

   PM tasks are described, but no specific costs are enumerated.

5. Do the total funds requested (Form I, Question 17A) equal the combined total annual costs in the budget summary?

   XYes **-**No

   If no, please explain (for example, are costs to be reimbursed by cost share funds included in the budget summary).

   Budget proposal based uoopn receiving federal funds.

6. Does the budget justification adequately explain major expenses?

   XYes **-**No

If no, please explain:

7. Are there other budget issues that warrant consideration?

   -Yes **X**No

   If yes, please explain:

Other Comments: